LOUISIANA DEPARTMENT OF WILDLIFE & FISHERIES

OFFICE OF FISHERIES
INLAND FISHERIES SECTION

PART VI -B

WATERBODY MANAGEMENT PLAN SERIES

LAKE LOUIS

WATERBODY EVALUATION &
RECOMMENDATIONS

CHRONOLOGY

DOCUMENT SCHEDULED TO BE UPDATED EVERY THREE YEARS

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WATERBODY EVALUATION

STRATEGY STATEMENT

Recreational

Sportfish species, primarily largemouth bass (LMB) and crappie, are managed to provide a sustainable population while providing anglers the opportunity to catch or harvest adequate numbers of fish to maintain angler interest and efforts

Commercial

Historical fish biomass samples using rotenone indicate that Lake Louis supported an abundance of commercial fish species including catfish, (*Ictalurus* spp. and *Pylodictis olivaris*), freshwater drum (*Aplodinotus grunniens*), and buffalofish (*Ictiobus* spp.) in the past. Flood control projects over the past 60 years have changed water flow patterns and fisheries habitat in such a manner that Lake Louis currently does not support high numbers of commercial species. As a result, commercial fishing effort is minimal and a commercial fisheries management strategy is not used.

Species of Special Concern

No threatened or endangered fish species are known to inhabit this waterbody. However, due to periodic backwater flooding, exotic Asian carp (i.e., *Ctenopharyngodon idella, Cyprinus carpio, Hypophthalmichthys* spp.*)* and transient riverine species are likely to inhabit the lake. LDWF fisheries personnel observed silver carp leaping in numerous areas of the lake in the winter of 2015/2016.

EXISTING HARVEST REGULATIONS

Recreational

Statewide regulations for all fish species, the current recreational fishing regulations may be viewed at the link below: http://www.wlf.louisiana.gov/regulations

Commercial

The current commercial fishing regulations may be viewed at the link below: http://www.wlf.louisiana.gov/regulations

SPECIES EVALUATION

Recreational

Largemouth bass is targeted for sampling as a species indicative of the overall fish population due to their high position in the food chain. Electrofishing is the best overall indicator of largemouth bass abundance and size distribution, with the exception of large bass. Gill net sampling is generally the preferred method to determine the status of large bass and other large bodied fish species.

Largemouth Bass

Relative abundance and size structure indices

Historical standing crop estimates from biomass (rotenone) sampling indicate that all species of game fish populations were low. In the 1960's, forage species dominated the sample. In the 1980's, commercial species were the dominant species collected (Table 1). Since 1999, electrofishing results have been used as an indicator of LMB abundance, with total catch per unit effort (CPUE) (Figures 1 and 2). Louisiana Department of Wildlife and Fisheries (LDWF) sampling protocol calls for electrofishing to be conducted in the spring and fall. However, high turbidity levels generally occur during the spring in Lake Louis, which limits visibility and reduces the efficiency of capture. Therefore, spring electrofishing results are not a reliable indicator of bass abundance in Lake Louis as CPUE values are inconsistent and low. For this reason, fall electrofishing will be used when sampling Lake Louis fish populations. Fisheries data indicate that the current lake management plan, which includes annual fall/winter drawdowns, has been beneficial to sportfish. Bass electrofishing results indicate a relatively stable population since 1999 (Figures 3 and 4). The only exception to this is for the results in 2008 after record rainfall and flooding in the Lake Louis watershed caused by Hurricane Ike.

Table 1. Standing crop estimates from biomass (rotenone) sampling in Lake Louis, Louisiana, 1960-1988.

Standing Crop Estimates from Biomass (Rotenone) Results: Percent of Total Sample by Weight			
Year	Forage Species	Game Species	Commercial Species
1960	53.4%	14.7%	31.9%
1971	64.3%	11.7%	24.0%
1986	9.6%	14.8%	75.6%
1987	10.8%	6.2%	83.0%
1988	15.8%	16.0%	68.2%

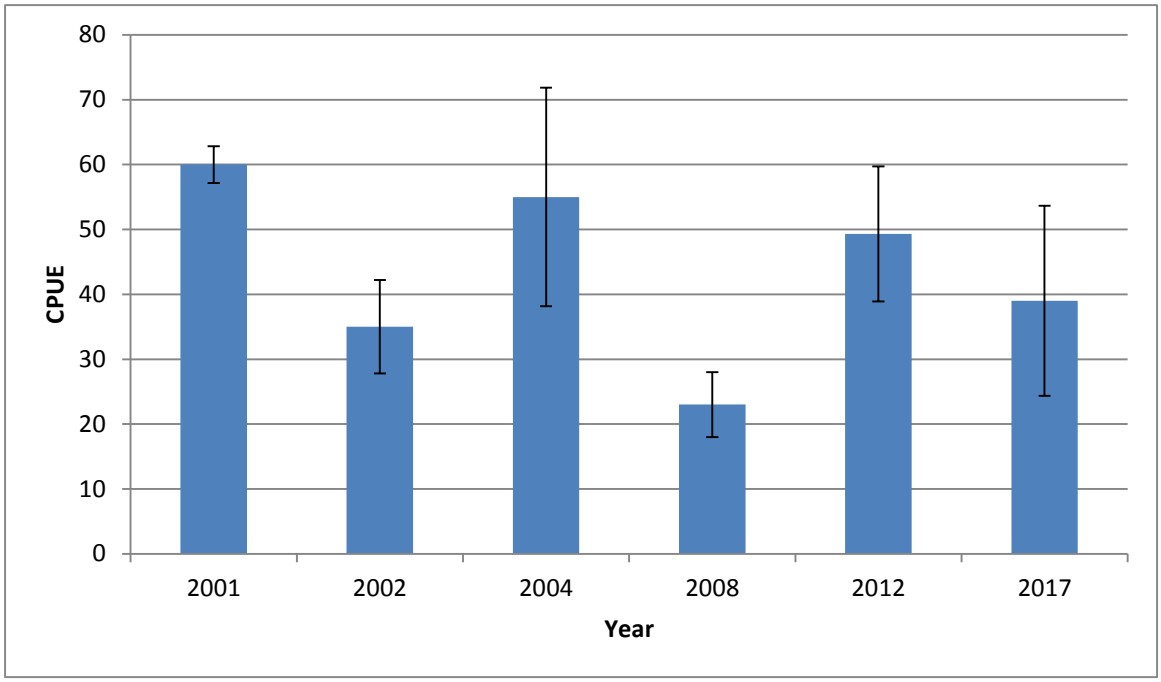

Figure 1. The total CPUE (± SE) for all size classes of largemouth bass from Lake Louis, Louisiana in spring electrofishing results for years between 2001 and 2017.

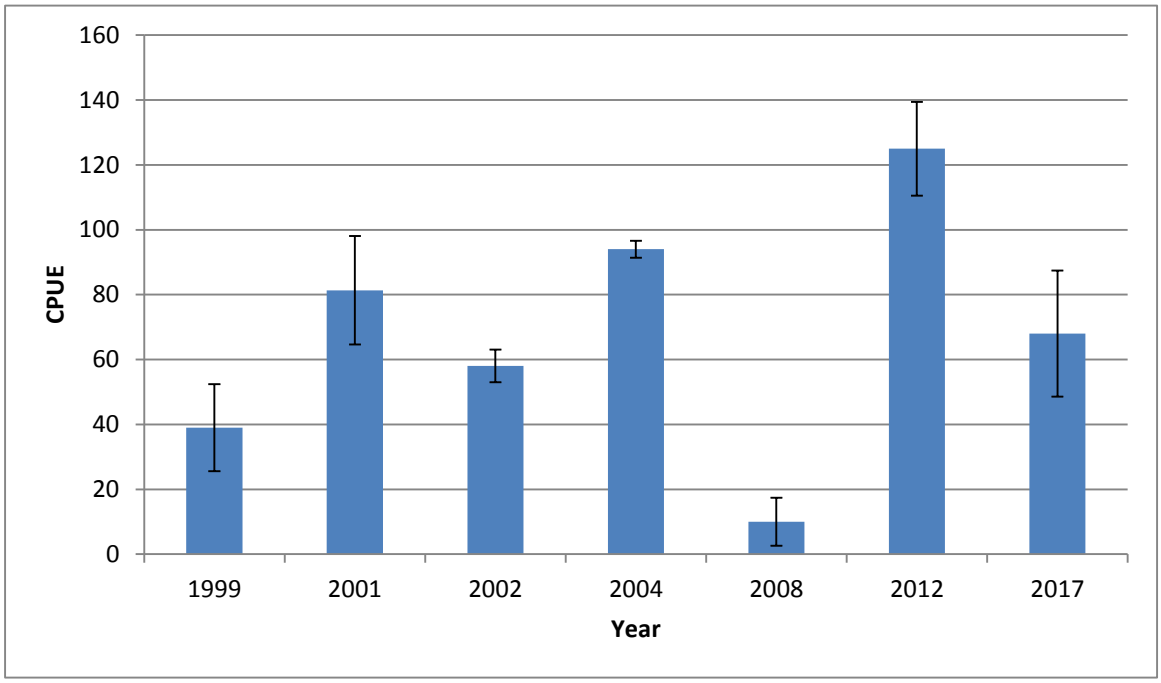

Figure 2. The total CPUE (± SE) for all size classes of largemouth bass from Lake Louis, Louisiana in fall electrofishing results for years between 1999 and 2017.

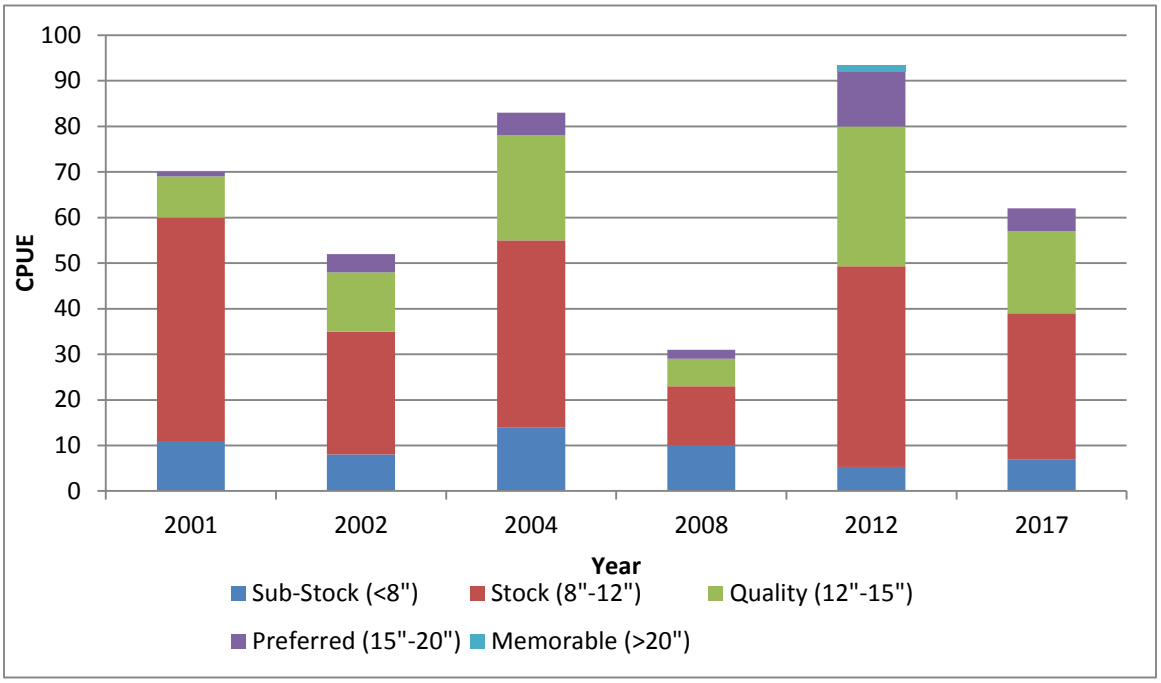

Figure 3. The average CPUE for largemouth bass by size class collected from Lake Louis, Louisiana during spring electrofishing 2001 – 2017.

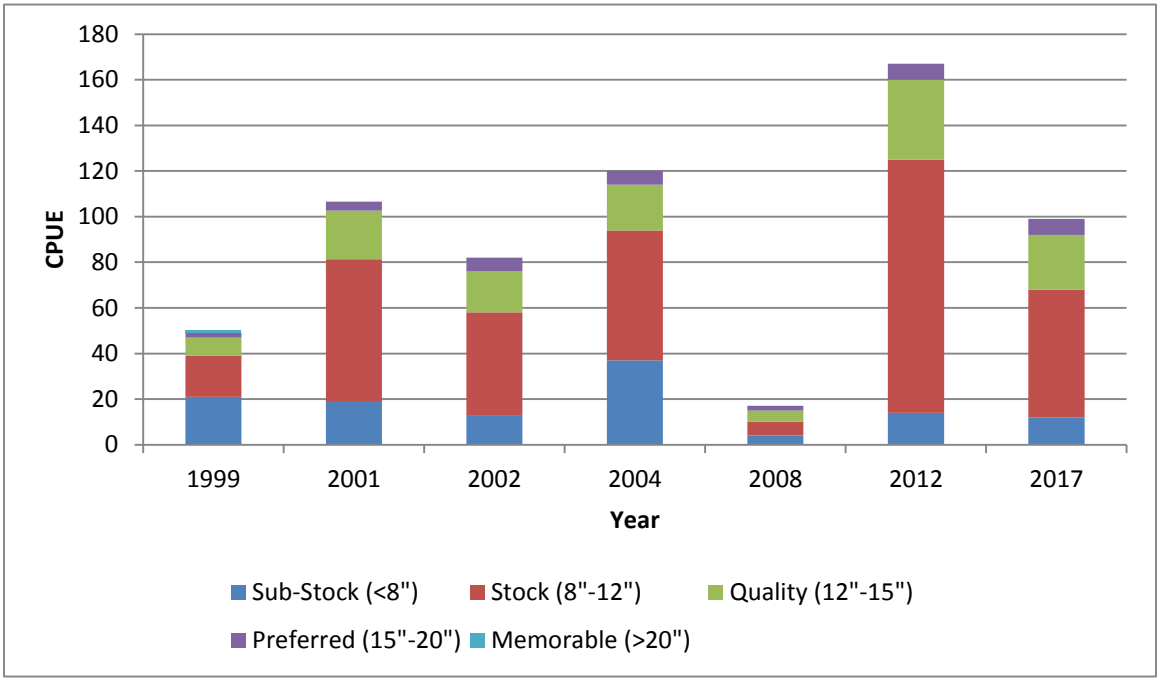

Figure 4. The average CPUE for largemouth bass by size class collected from Lake Louis, Louisiana during fall electrofishing 1999 – 2017.

Proportional stock density (PSD) and relative stock density (RSD) are indices used to numerically describe length-frequency data. Proportional stock density compares the number of fish of quality size (greater than 12 inches for largemouth bass) to the number of bass of stock size (8 inches in length). PSD is expressed as a percent. A fish population with a high PSD consists mainly of larger individuals, whereas a population with a low PSD consists mainly of smaller fish. For example, Lake Louis had a PSD of 56 for 2004 (Figure 5). The number indicates that 56% of the bass stock (fish over 8 inches) in the sample were at least 12 inches or longer. Individual lakes vary widely in their ability to support populations of bass. Generally, PSD's between 40 and 60 are considered good.

$$PSD = \frac{\text{Number of bass>12 inches}}{\text{Number of bass>8 inches}} \text{ x100}$$

Relative stock density (RSD) is the proportion of largemouth bass in a stock (fish over 8 inches) that are 15 inches or longer.

$$RSD = \frac{\text{Number of bass>15 inches}}{\text{Number of bass>8 inches}} \text{ x100}$$

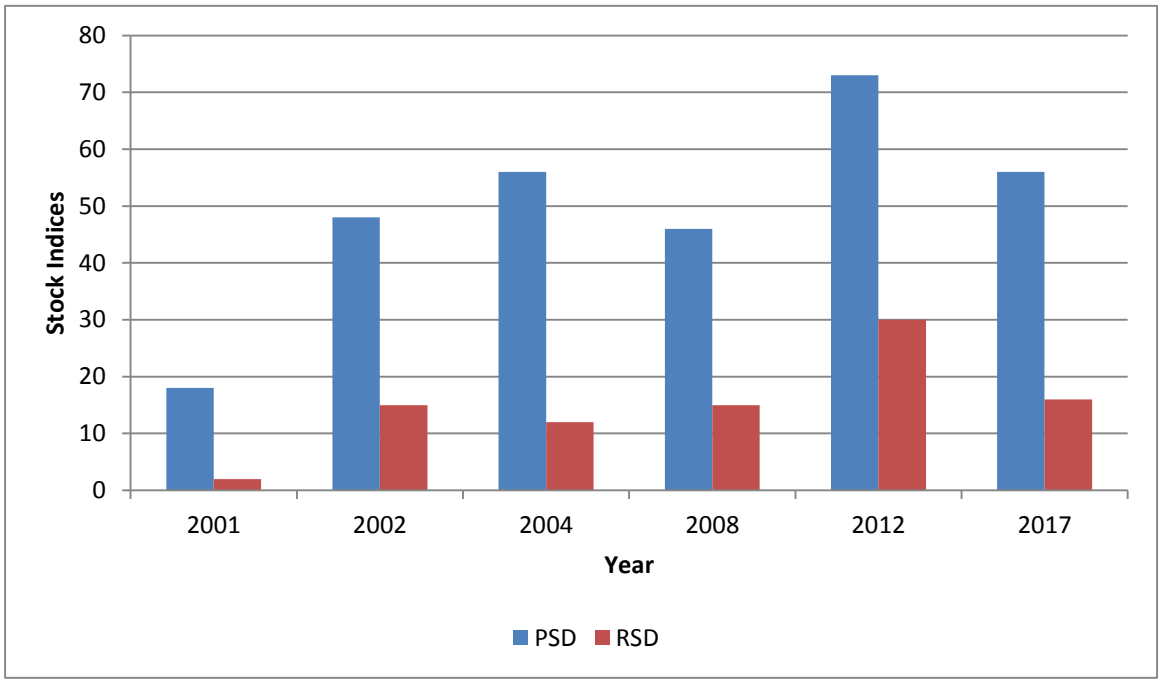

Figure 5. The size structural indices (PSD and RSD-p) for largemouth bass collected from Lake Louis, Louisiana in spring electrofishing samples from 2001 – 2017.

Trends in sampling data indicate PSD's have been relatively stable and within the desired range with 2001 and 2012 being the exceptions.

Largemouth Bass Age and Growth

The largemouth bass age structure was analyzed in 2002. Results indicate growth rates similar to other lakes in the same geographical area of the state. Results are found in Figure 6. The study found a high percentage of the LMB population to be in the 0, 1, and 2-year age classes (Figure 7). This age structure is similar to most lakes in Louisiana. It also indicates that successful LMB recruitment occurred in Lake Louis during 2000, 2001, and 2002 following the annual fall/winter drawdowns in the previous years.

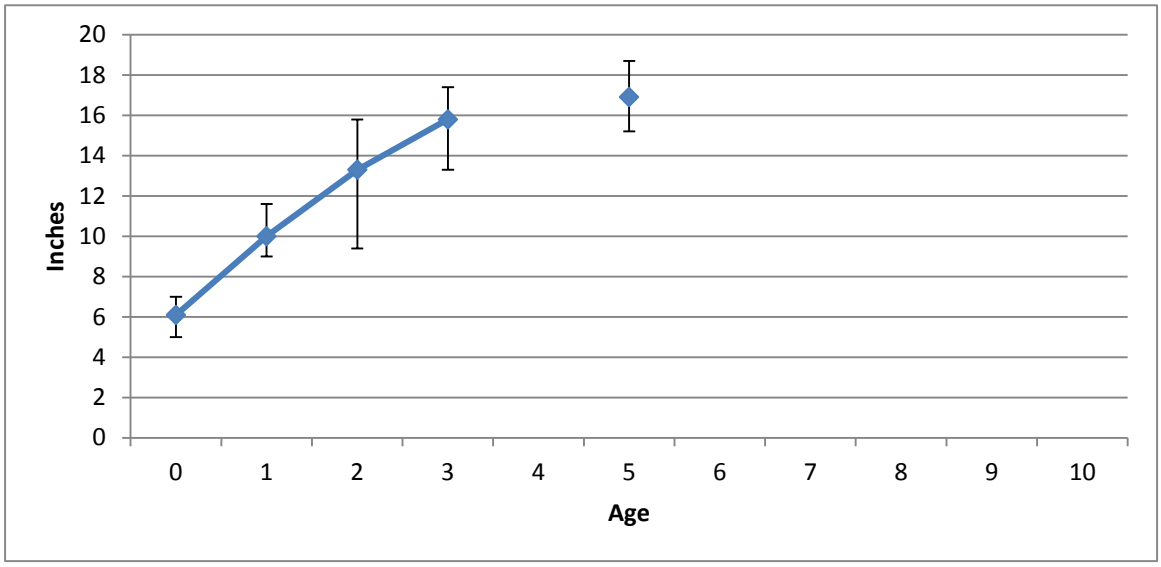

Figure 6. The mean length (±SE) at age of capture for largemouth bass from Lake Louis, Louisiana in 2002 (N=56).

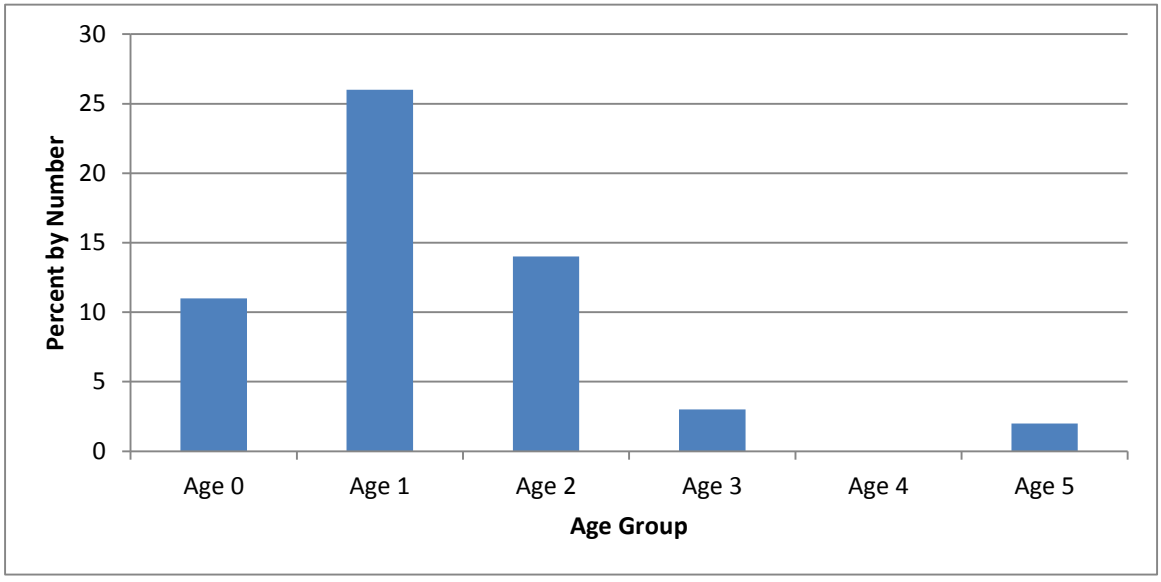

Figure 7. The age structure composition (percentage) for largemouth bass from Lake Louis, Louisiana for 2002 (N=56).

Forage

Forage availability is measured through two methods of sampling fish community composition. These methods include shoreline seine hauling and electrofishing. Shoreline seining results can be found below in Figure 8. Major forage species included various sunfishes (*Lepomis* spp.), minnows (*Fundulus* spp.), shiners (*Notropis* spp.), and shad (*Dorosoma* spp.). Fall forage electrofishing in 2012 and 2017 indicate that sunfishes and shad species are the major forage (Figure 9). Forage availability is also measured indirectly through measurement of largemouth bass body condition or relative weight. Relative weight (Wr) is the ratio of a fish's weight to the weight of a "standard" fish of the same length. The index is calculated by dividing the weight of a fish by the standard weight for its length and multiplying the quotient by 100. Largemouth bass relative weights below 80 indicate a potential problem with forage availability. The relative weights of LMB collected from Lake Louis exceeded 85 for all size groups, indicating adequate available forage (Figure 10).

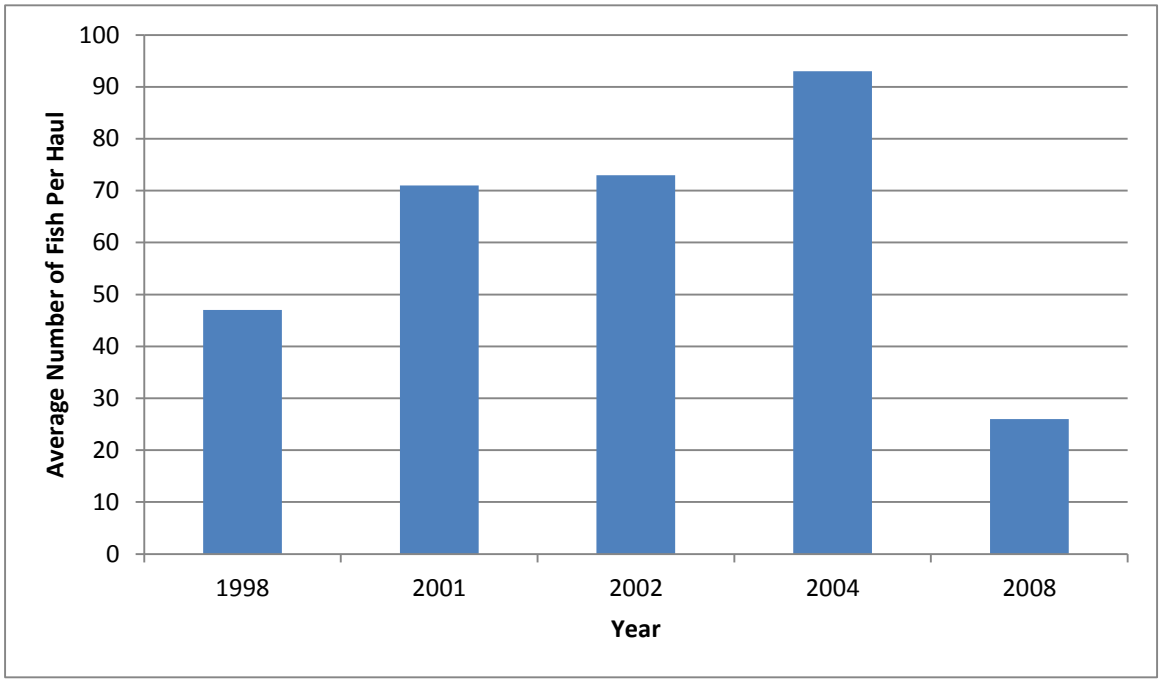

Figure 8. Average number of forage species $\leq$ 6 inches in total length captured in two seine hauls taken from Lake Louis, LA for 1998 through 2008.

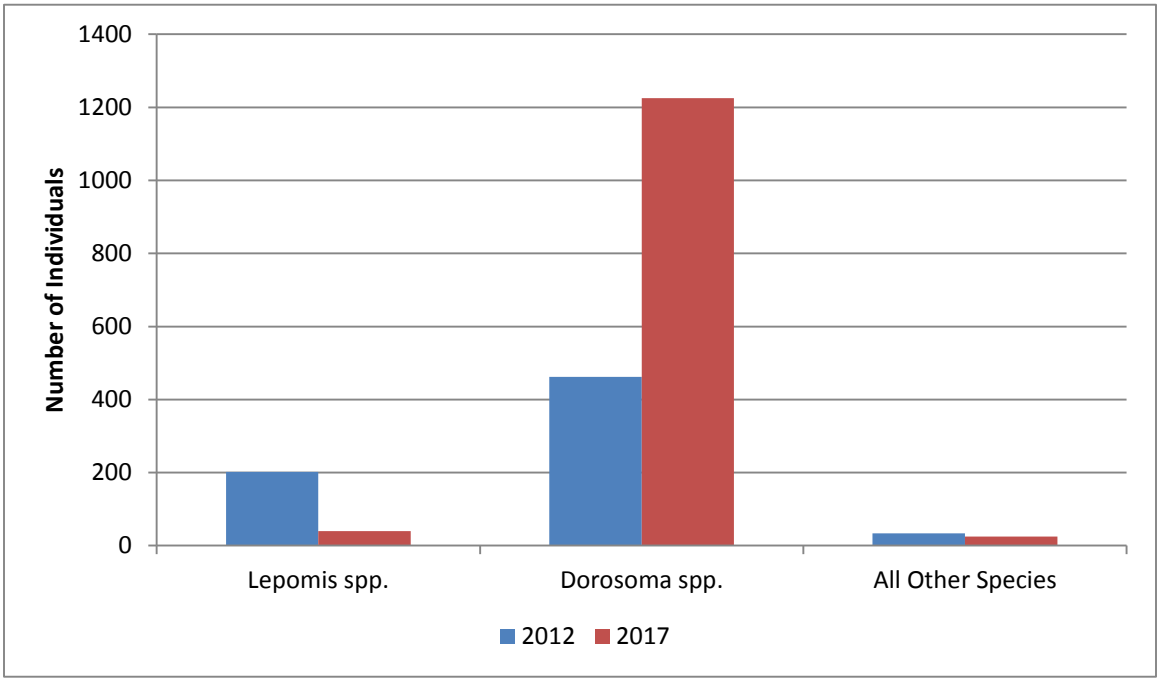

Figure 9. Number of *Lepomis* spp., *Dorosoma* spp., and all other species less than 6 inches TL captured in standardized fall forage samples on Lake Louis, LA from 2012 and 2017.

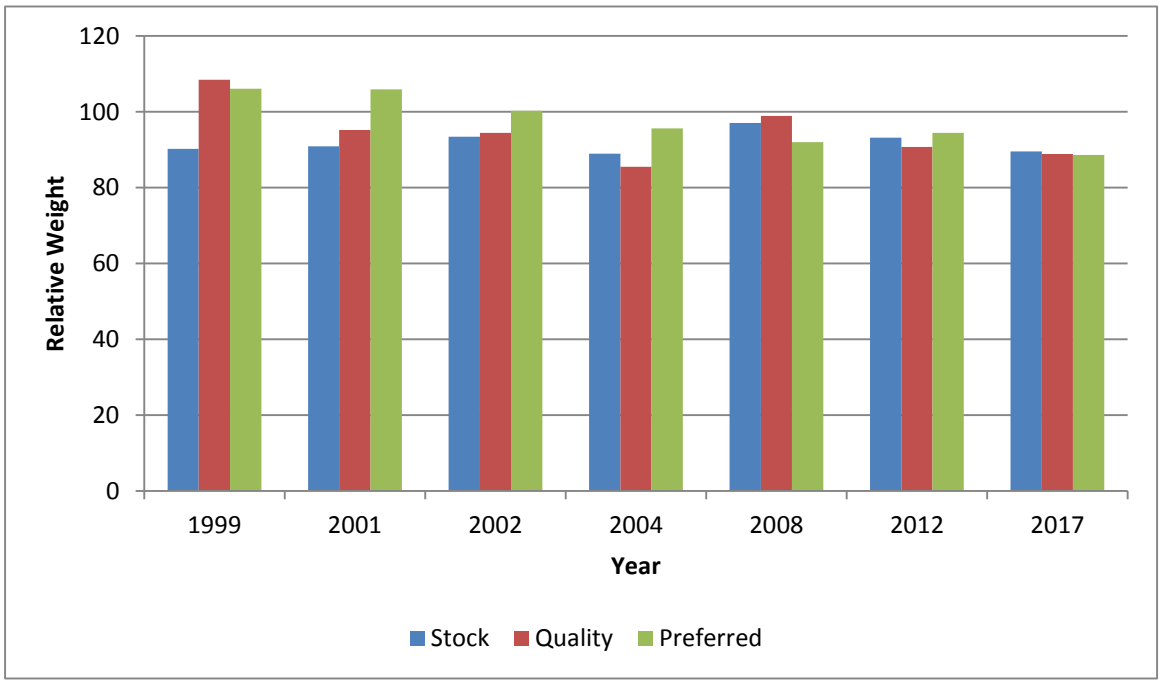

Figure 10. The relative weights for stock-, quality-, and preferred-size classes of largemouth bass collected from Lake Louis, Louisiana during fall electrofishing from 1999 to 2017.

Largemouth bass genetics

Florida largemouth bass (FLMB) have been stocked into Lake Louis seven times since 1999. See Table 2 for complete stocking results. Stocking has not occurred since 2009 due to the lack of success with previous stockings. Historically high turbidity levels occur during the spring and summer in Lake Louis. Largemouth bass stocking during this period of high turbidity has proven to be unsuccessful for these sight feeding predators. The annual drawdowns that occur on Lake Louis may also adversely impact the success of Florida bass introduction. Genetic testing in 2002 found only 1.7% of the fish tested had Florida alleles. Subsequent testing in 2008 found no Florida alleles in the population.

Table 2. The historical Florida largemouth bass stockings for Lake Louis, Louisiana, from 1999 until present.

Year	FLMB Stocking
1999	19,973
2000	11,970
2002	14,161
2003	14,282
2004	14,025
2008	9,900
2009	11,590

Crappie

The crappie population in Lake Louis consists primarily of white crappie with an occasional black crappie being caught. White crappies are more adapted to the turbid, open water habitat found in Lake Louis. Crappies are one of the most sought after species by fishermen who utilize the lake. Crappie populations are currently sampled with electrofishing techniques and lead nets.

A crappie population and fishery characteristics study was conducted in 2013, 2014, and 2016. Leadnets were used to collect crappie from Lake Louis each fall. Length and weight measurements were recorded for each fish and sagittal otoliths (ear bones) were removed from approximately 30% of the sampled fish for age and growth analyses. Angler creel surveys were conducted during 2016 to document fishing effort, angler catch rate, and harvest rates.

Population Characteristics

Species Composition: White crappie were the predominant crappie species sampled from 2013-14 and in 2016 in Lake Louis. Lake Louis supports a healthy crappie population with some individual crappie reaching 13 inches (Figure 11). Four to 12-inch fish were observed in all three years of the project and the recurring presence of small 4 to 8 inch (age-1) crappie indicates successful reproduction from the previous year. The samples were comprised of 92% white crappie and 8% black crappie.

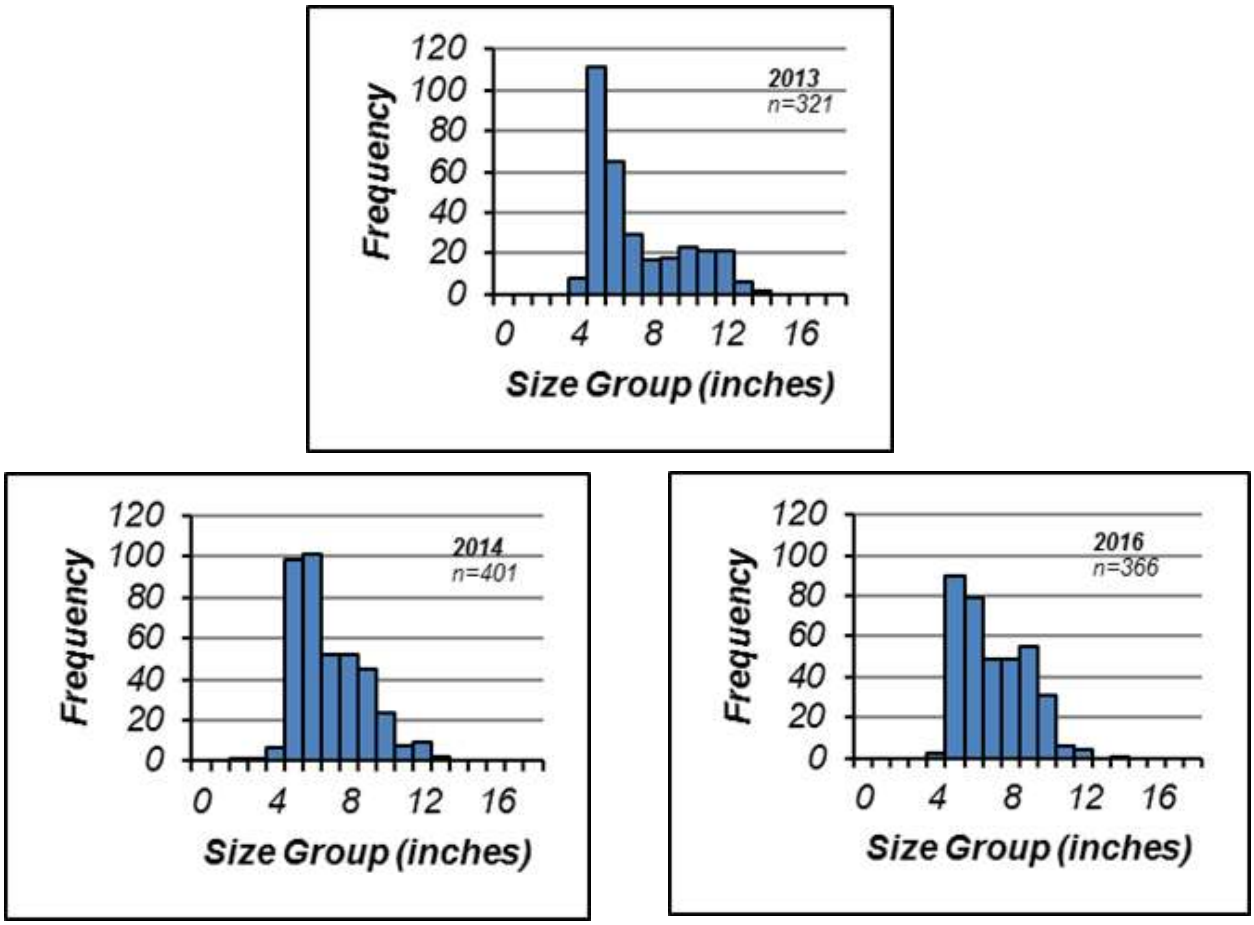

Figure 11. Length distributions of crappie collected from Lake Louis during fall leadnet surveys in 2013, 2014, and 2016. Sample sizes (n) are presented in each graphic.

Eighty-eight percent of the total sample was comprised of age-1, age-2 and age-3 crappie (Figure 12). While crappie up to 6 years of age were found, only a small percentage of Lake Louis crappie were 4 years and older. On average, growth is generally rapid through age-2, but then slows to only two inches or less in length per year (Table 3).

Overall, body condition for Lake Louis crappie can be described as good for all size classes of fish. Condition of crappie is generally related to food supply and its availability to predation.

One of the more significant findings is the moderately stable recruitment of age-1 crappies in the Lake Louis population, which can be attributed to consistently favorable spawning conditions.

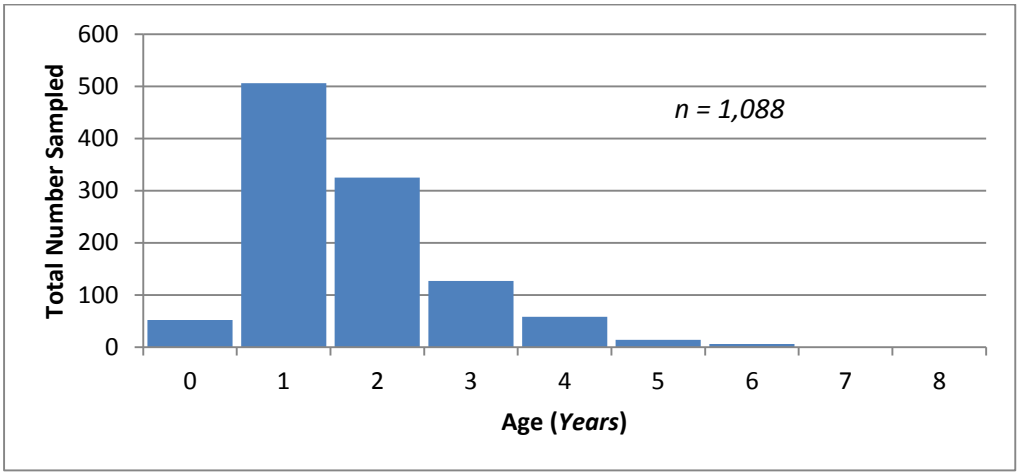

Figure 12. The age structure of Lake Louis crappies 2013, 2014 and 2016.

Table 3. Average age at length for Lake Louis crappie 2013, 2014 and 2016.

Age in Years	Length in Inches
2.2	8.0
3.44	10.0
5.93	12.0

The rate at which fish die each year is referred to as mortality. Mortality consists of two parts: natural mortality (predation, disease) and fishing mortality (angler harvest and discard mortality). Results of the study indicate that the total mortality rate for Lake Louis crappie is moderately low (65%) when compared to other recently sampled Louisiana lakes. The following example is provided to illustrate the effect: At 65% mortality, if you start with 100 age-1 Lake Louis crappie, 35 will remain alive by age-2, 12 by age-3, 4 by age-4 and only 1 fish will remain alive by age-5.

The results of this study suggest that the Lake Louis crappie population has a total mortality that is equally influenced by natural factors and fishing related mortalities (33% and 32%, respectively). The fishing mortality rate for Lake Louis crappie is 32% per year. This rate comes from two sources; 1) harvest and 2) post release mortality.

Fishery Characteristics

Louisiana crappie fisheries are described as harvest oriented. According to the 2000 Louisiana Crappie Fishing Survey, 74% of crappie anglers reported that they harvested crappie for food. The size distribution of angler harvested crappie from Lake Louis during 2016 is shown in Figure 13. While some smaller 7 inch crappies were observed in the surveys, 8 to 11-inch crappie dominated the catch. Survey results also indicated that 38% of crappie anglers harvested from 1 - 5 crappie per trip, while 22% of the anglers harvested no crappie at all (Figure 13). The annual estimated catch rate for Lake Louis crappie was 3.8 fish per angler hour (Table 4) or 15.6 fish per trip. The mean crappie catch rate estimate from the Lake Louis fishery (3.8) was the highest estimate for all project waterbodies, and ~64% greater than the next highest estimate (Toledo Bend Reservoir; 2.3) and more than twelve times greater than the lowest estimate (Lake Bruin; 0.3). The mean length and weight of all crappie harvested on Lake Louis was 10.1 inches and 0.51 lbs., respectively.

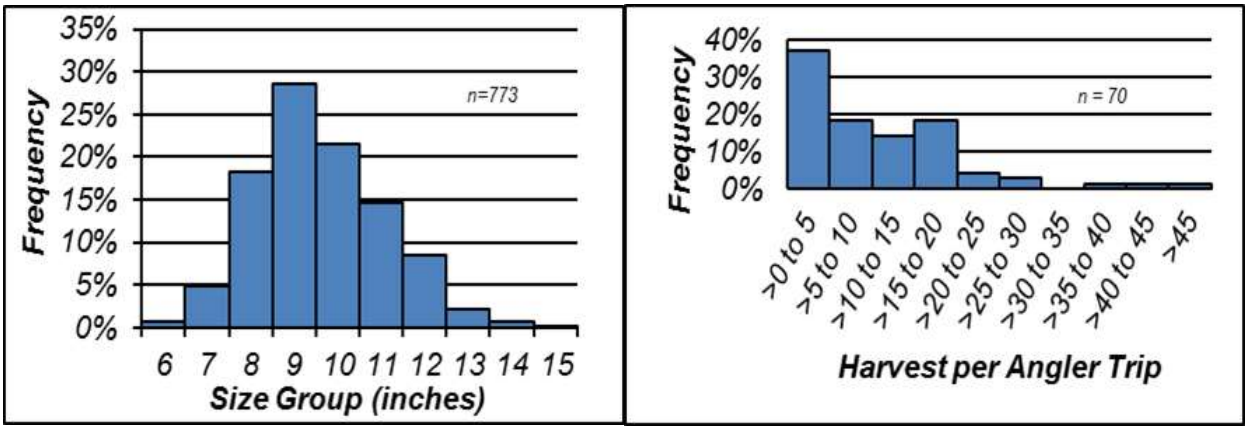

Figure 13. Size distribution of crappie harvested and harvest per angler-trip for Lake Louis crappie anglers derived from the creel survey conducted in 2016. Sample sizes (n) presented in each graphic represent number of crappie harvested (left graphic) and number of crappie anglers that harvested crappie (right graphic). Of the 90 crappie anglers interviewed, 20 (22%) anglers did not harvest a crappie.

Table 4: Mean crappie catch rates (per angler hour) for waterbodies included in the Louisiana project with a completed creel survey, upper and lower 95% confidence intervals (CI), the year each creel survey was conducted, and the number of crappie anglers interviewed. Estimates are sorted from highest to lowest with Lake Louis results highlighted.

Waterbody	Metric	Year(s)	n (Anglers)	Estimate	L95%CI	U95%CI
Louis	Catch Per Angler Hour	2016	90	3.78	3.20	4.37
Toledo	Catch Per Angler Hour	2009,10	N/A	2.31	1.18	3.43
Caney	Catch Per Angler Hour	2015	91	1.66	0.95	2.38
Cross	Catch Per Angler Hour	2010	128	1.54	0.86	2.21
Vernon	Catch Per Angler Hour	2010	33	1.54	0.44	2.63
Sibley	Catch Per Angler Hour	2016	114	1.50	0.95	2.05
Red River (P5)	Catch Per Angler Hour	2014	38	1.48	1.31	1.65
Poverty Point	Catch Per Angler Hour	2012	260	1.42	1.10	1.75
D'Arbonne	Catch Per Angler Hour	2011	267	1.37	1.11	1.63
Larto/Saline	Catch Per Angler Hour	2015	190	1.17	0.86	1.49
Bundick	Catch Per Angler Hour	2016	151	1.06	0.82	1.31
Caddo	Catch Per Angler Hour	2011	95	1.04	0.61	1.47
Grand Bayou	Catch Per Angler Hour	2015,16	171	1.03	0.82	1.23
Fausse Pointe	Catch Per Angler Hour	2015	78	0.97	0.50	1.43
Raccourci	Catch Per Angler Hour	2015	120	0.50	0.35	0.65
Bruin	Catch Per Angler Hour	2014	22	0.30	0.11	0.50

Population simulations illustrating the effects of two theoretical size regulations were calculated. Using the mortality rate (65%) determined for Lake Louis, anglers would be required to release 59% of all fish caught under a 10" minimum length limit (MLL) and approximately 95% of their catch under a 12" MLL due to a length limit regulation. Harvest per trip would be reduced by 50% with a 10" MLL and by 90% with a 12" MLL.

Summary

It is important to note that crappie populations and their fisheries are not only influenced by fishing effort, but also by anthropogenic and environmental factors. The type and degree of human activity within watersheds, riparian zones, and specific waterbodies can affect crappie

populations by altering critical habitats. Additional factors influencing crappie populations include aquatic vegetation coverage, water level management, and habitat improvements. The frequency of floods, drought, and hurricanes can also influence crappie populations. While consideration of these factors is important in effective fisheries management, evaluating how these factors affect the Lake Louis crappie population and fishery is beyond the scope of this report.

The Lake Louis crappie population has a moderately high maximum age, slow growth rate, moderately low mortality rate, with moderately low recruitment variability when compared with the other crappie populations included in this project. The Lake Louis crappie fishery is currently managed with no size restrictions and a 50 fish per day creel limit. Given the current dynamics of the Lake Louis crappie population and fishery, size limit implementation would cause a significant decrease in yield while substantially increasing the numbers of crappie that would need to be released by anglers (59% for 10-inch MLL and 95% for a 12-inch MLL). Because so few anglers harvest more than 25 crappie per angler trip (4%), few fish would be saved from harvest from a daily creel limit reduction unless the reduction is substantial. Any regulation change that reduces harvest may further exacerbate the slow growth rate of the Lake Louis crappie population.

Commercial

Large rough fish species that comprise a commercial fishery are not found in sufficient numbers to support a viable commercial fishery. However, gill netting results in 2002 and 2014 found a wide variety of commercial species, but the overall quantity for each species was low. Gill net results are depicted in Figure 14.

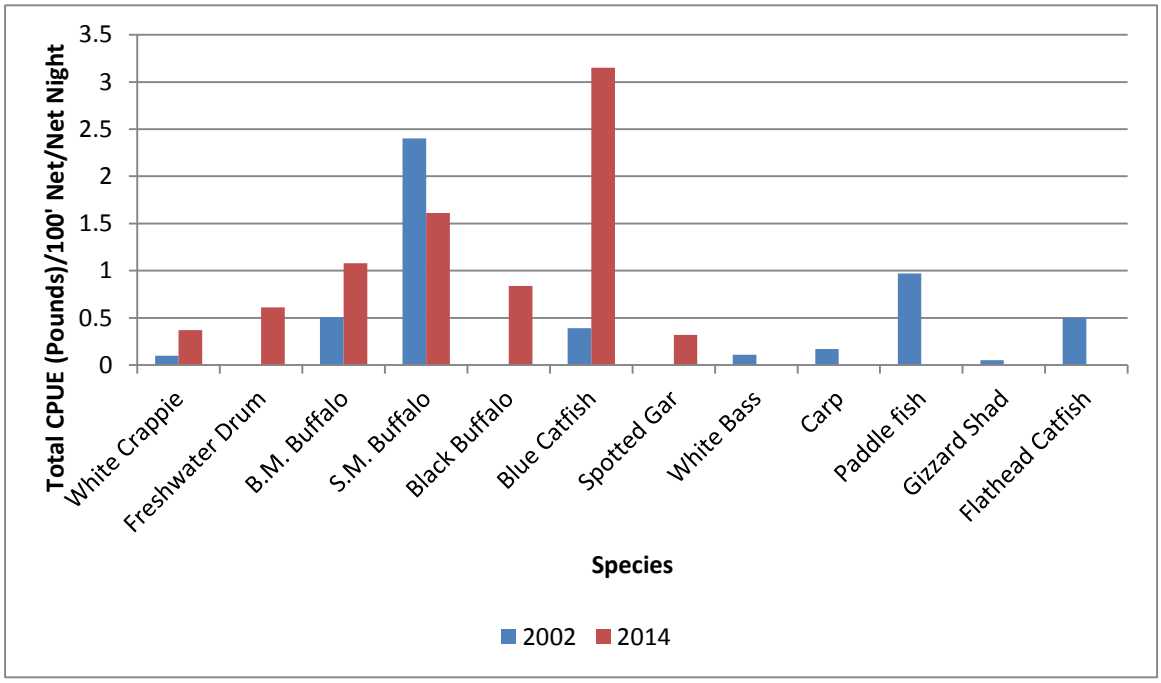

Figure 14. The CPUE (pounds per net night per 100' net) for sport-, commercial- and rough fish collected in gill nets from Lake Louis, Louisiana for 2002 and 2014.

Creel Survey

An angler creel survey was conducted on Lake Louis in 2016 to gather data on recreational fishing efforts and harvest. This survey coincided with the crappie population study. Out of 85 total interviews, crappie anglers were the most numerous species-specific cohort of anglers interviewed (Table 5). Largemouth bass anglers had a 3.5 LMB catch per angler trip with a 35% retention rate. Size distributions for largemouth bass indicate that 11 to 13-inch largemouth bass dominated the catch (Figure 15). Crappie anglers had a 15.35 crappie catch per angler trip with a 54% retention rate, with quality and preferred-size fish being harvested most frequently (Figures 16 and 17).

Table 5. Largemouth bass and crappie catch statistics from the creel survey on Lake Louis, LA in 2016.

Total Interviews	LMB Anglers Interviewed	LMB Catch Per Angler Trip	LMB Retention Rate (%)	Crappie Anglers Interviewed	Crappie Catch Per Angler Trip
85	21	3.50	35.05	90	15.35

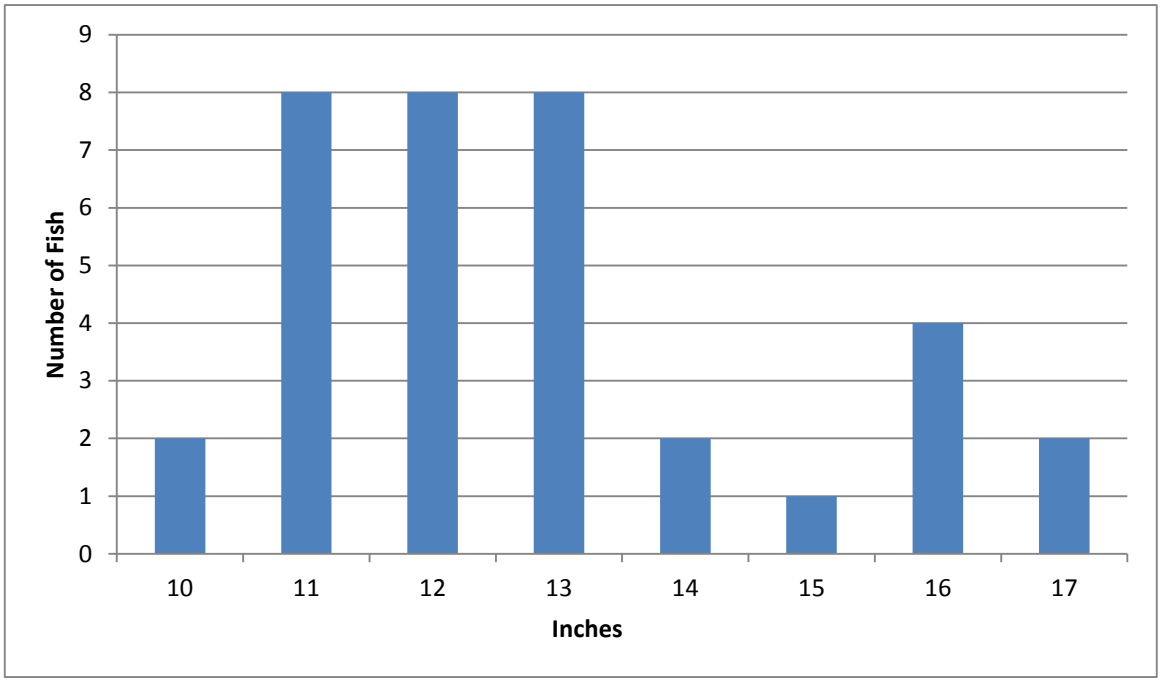

Figure 15. Size distribution (inch groups) of harvested largemouth bass from Lake Louis, LA creel in 2016.

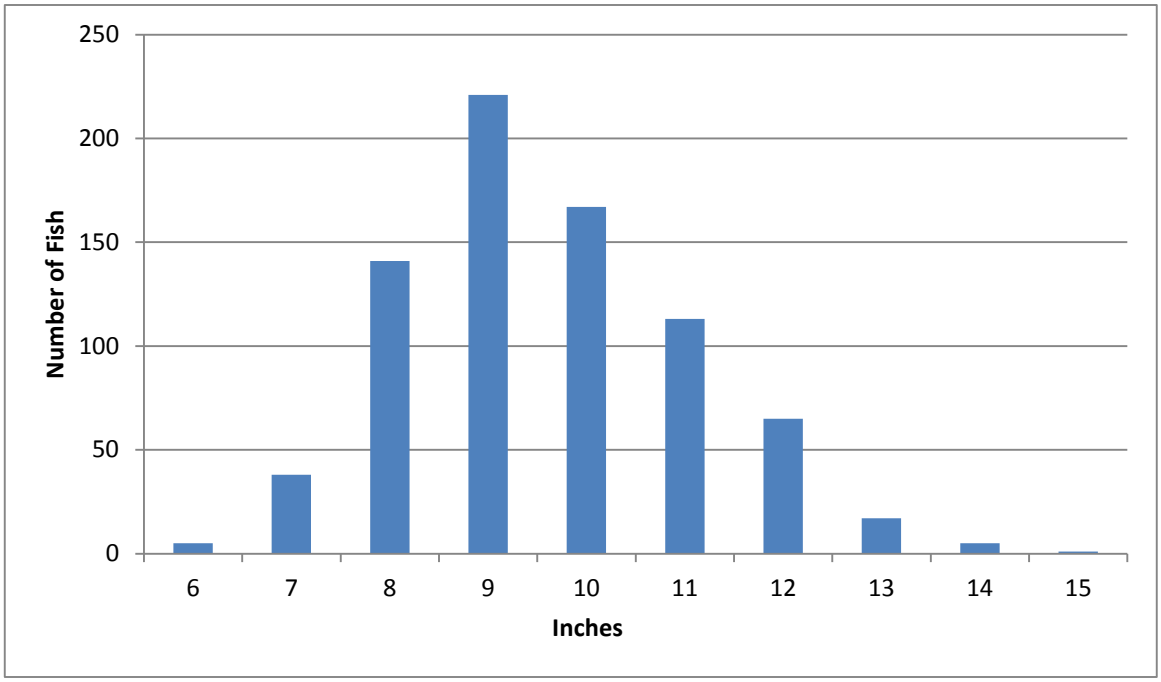

Figure 16. Size distribution (inch groups) of harvested crappie from Lake Louis, LA creel survey in 2016.

Figure 17. Crappie harvest percentage by size class from Lake Louis, LA creel survey in 2016.

HABITAT EVALUATION

Aquatic Vegetation

Almost no submersed aquatic vegetation is present in Lake Louis. Several conditions exist that prevent submersed vegetation growth. The lake bottom has steep contours resulting in few shallow water areas. The high turbidity levels that occur in the spring and early summer prohibit sunlight penetration through the water column, and restricts plant growth. Annual drawdowns of four feet have occurred each fall/winter since 1999. Emergent plants in the lake consist of alligator weed (*Alternanthera philoxeroides*) and water primrose (*Ludwigia spp*.). Total aquatic vegetation coverage is less than 5%. There is a shoreline fringe of water elm, swamp privet, and cypress trees along much of the lake.

Summer survey (August 3, 2011) revealed that there were no problem plant species present. There was a fringe of alligator weed along the shoreline. It was very sporadic and covered less than 10 acres, providing limited benefit to fish species. No submersed vegetation was observed.

No problem vegetation was observed in 2012. Alligator weed coverage was similar to what was noted during the assessment in 2011.

No problem vegetation was observed in 2013. Alligator weed coverage was similar to what was present in 2011 and 2012. No submerged vegetation was observed.

A vegetation survey was conducted in the fall of 2015, and no problem vegetation was observed. No problem vegetation was observed in 2016.

No problem vegetation is expected for 2019. A vegetation survey was conducted on August 8, 2018. Very little vegetation was observed. No floating or submersed vegetation was observed. Less than an acre of emergent growth was observed. This consisted of alligator weed, primrose, broadleaf arrowhead (*Sagittaria latifolia*), and American water plantain (*Alisma subcordatum*).

Substrate

High silt loads from agricultural runoff and loss of backwater connectivity to the Ouachita River have created high silt loads in Lake Louis. This is particularly apparent on the shallow flats on the north end of the lake. The Bayou Falcon boat ramp located in Sicily Island was built in the late 1960's and is no longer usable due to sedimentation. The recent mitigation structure (Fool's River Pumping Plant) diverts Tensas River water from Lake Louis. Additional structures allow for flushing and annual drawdowns have helped compact the siltation by mimicking the seasonal cyclic flooding and drying that would occur naturally in a river backwater system. Although improved, the lake still suffers from siltation and high turbidity from nearby agricultural runoff during heavy rainfall events.

Artificial Structure

The LDWF has not placed artificial structure in Lake Louis. The only manmade structure found in the lake consists of boat docks and piers, located in the northern half of the lake.

CONDITION IMBALANCE / PROBLEM

In 1956, an earthen dam was installed between Bayou Louis and the Ouachita River. This closure prevented historical backwater flow from the Ouachita River. This allowed the more turbid Tensas River water to become the main source of backwater entering Lake Louis. History has shown that when turbidity levels increase above a healthy threshold within a waterbody, a decrease in overall aquatic productivity generally follows. This is usually followed by an increase in rough fish species and a corresponding decrease in game fish. Biomass estimates (rotenone samples) were conducted in 1960 and indicated an out of balance fish population with excess forage species and a shortage of predatory game species. Biomass samples conducted later in the 1980's showed a fish population with a high proportion of commercial fish species.

In 2002, the Sicily Island Flood Control Levee Project was completed. This project completely enclosed the lake within a levee and prohibits the turbid Tensas River water from entering the lake. Mitigation for the levee project included a control structure, a weir and pumping stations, and several plugs which would allow drawdown, flushing, and agricultural runoff diversions away from Lake Louis in order to reduce the silt load and turbidity problem. Annual drawdowns have been conducted since 1999 and water levels are allowed to exceed pool elevation during spawning months. These measures have been beneficial, but high turbidity is still an issue during the spring of the year and after rain events.

CORRECTIVE ACTION NEEDED

Although watershed improvements, water control structures and the current habitat management plan have improved the turbidity problem, periods of high turbidity still occur during periods of heavy rainfall. This is primarily due to agricultural land use practices and runoff into the lake. In 2012, the Natural Resource Conservation Service began a cost share incentive program for farmers in the Lake Louis watershed to encourage better farming practices. Over time this should help reduce the amount of silt runoff that goes into the lake.

RECOMMENDATIONS

1. Continue with the current habitat management plan that has been in place since 1999. This plan calls for annual water fluctuations (drawdowns) of 4 feet beginning on September 1 of each year and ending on February 15th of the following year. This plan mimics natural water level fluctuations and should continue to reduce shoreline sedimentation and improve spawning substrate. The cooperative plan can be viewed in MP-A Appendix IV.

2. Continue scheduled standardized fisheries sampling to determine status of sportfish and forage populations.

Aquatic Plant Recommendations for 2019

1. Late summer monitoring for detection of invasive vegetation conducted annually.

2. Foliar herbicide applications will be made as necessary with appropriate herbicides as recommended by the LDWF Aquatic Plant Control Program. However, foliar applications have never been required in Lake Louis thus none are expected in 2019.